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AN EXPONENTIAL UPPER BOUND FOR FOLKMAN NUMBERS

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For given integers k and r, the Folkman number $f(k;r)$ is the smallest number of vertices in a graph G which contains no clique on $k+1$ vertices, yet for every partition of its edges into r parts, some part contains a clique of order k. The existence (finiteness) of Folkman numbers was established by Folkman (1970) for $r = 2$ and by Nešetřil and Rödl (1976) for arbitrary r, but the upper bounds on $f(k;r)$ stemming from their proofs were astronomical.

In this paper we give an upper bound on $f(k;r)$ which is only exponential in a polynomial of k and r. Our proof relies on a recent result of Saxton and Thomason from which we deduce the Rödl-Ruciński Theorem (1995) establishing the threshold probability $p = p(n)$ for the Ramsey property of a random graph $G(n,p)$.